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Full Length Article

Analysis of the Effects of Complementary and Alternative Medicine (CAM) Methods to Decrease Body Image Dissatisfaction among Young Women during 2015-2020 and A Research Protocol

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ABSTRACT

Background: Body image dissatisfaction (BID) has garnered global attention. It is significantly correlated with the development of depression, anxiety, eating disorders (EDs) and low self-esteem. BID is increasingly common among adolescents and young women in China, whereas it lacks the effective treatment and prevention programs for BID.

Objective: This paper expects to analyze the effective CAMs methods on improving BID, and based on the results, we put forward a feasible and effective study protocol to fill the gap of BID improvement among teenage girls.

Methods: Fifty-two studies of CAM in 2015-2020 years in influencing body image and its correlates are collected and analyzed, and a study protocol combined "In Favor of Myself" is sent up. This study protocol adds praise, psychological counselling, nutrition education and yoga to the project "In Favor of Myself", improving BID through group support, shifting attention from focusing on one's physical appearance to enhancing one's value, and alleviating pressure and emotions through yoga.

Results: Many methods, such as fitness training, psychoeducation, nutritional therapy, music therapy, health promotion programs and internet-based interventions are considered the existing interventions to improve BID. Other CAMs, such as acupuncture, beauty care, Tai chi, and aromatherapy, could be tried in the improvement of BID in further studies.

Conclusion: CAM is capable of subjectively changing feelings of bodies, adjusting their cognition of body image, enhancing the body-mind connection, improving self-esteem and relieving negative emotions, but the efficacy and mechanism of CAM working on BID still need more systematic and standardized research.

1. Introduction

Body image refers to a subjective opinion regarding one's body, this opinion might be positive or negative, usually comprising of people's thoughts and feelings of the body, like the size and the shape of the entire body and parts of the body one perceives (Alleva et al., 2015, Wang et al., 2018, Noh et al., 2018). Body image dissatisfaction (BID) covers the subjectively negative assessment of the figures, weight, and body parts (Alleva et al., 2015, Troisi, 2020, Sampath et al., 2019). The maximal rate of BID in the US takes up 72% (Wang et al., 2018, Radwan et al., 2019). 87% of Italian women were dissatisfied with their body image (Wang et al., 2018). It has been drumming up global concern. In the previous studies, the BID has been considered to take place primarily in western nations, whereas the incidence of BID had been identified to rise continuously in Asian nations over the past few years. In Malaysia, over 70% of college females have BID, as well as over 50% of college males (Radwan et al., 2019). In India, young females mostly had BID, and 10% to 30% of teenage girls and young women were concerned with their body image (Sampath et al., 2019). In Chinese colleges, less than 13% of college students were satisfied with their body image (Wang et al., 2018).

BID is positively correlated with the negative mental status (e.g., low self-esteem, depression, anxiety (Alleva et al., 2015, Noh et al., 2018, Sampath et al., 2019, Aparicio-Martinez et al., 2019, Okop et al., 2019, Jung et al., 2017), suicide tendency (Noh et al., 2018, Sen et al., 2020, Geller et al., 2020) and lower happiness (Wang et al., 2018)). For BID patients, negative emotions of their body dissatisfaction cause emotional eating (Marks, 2015, Ahadzadeh et al., 2018), further leading to weight increase, and traps them into a vicious cycle (Ahadzadeh et al., 2018). These unhealthy behaviors and emotional eating that causing by BID are recognized as the main risk causes for eating disorders (EDs) prevalence worldwide (Alleva et al., 2015, Radwan et al., 2019, Weinberger et al.,

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2016, Izydorczyk et al., 2020). BID women may occur social physique anxiety (SPA) (Sen et al., 2020) due to a lack of body image confidence (Frederick et al., 2016). In addition, the BID will aggravate the adverse effects of chronic diseases correlated with mental health and eating behaviors (e.g., inflammatory bowel disease (IBD) among pediatric patients (Claytor et al., 2020)). The BID will also raise the risk of poor self-care and malnutrition (Claytor et al., 2020). For pregnant women, the BID is correlated with the prevalence of antenatal and postnatal depression. EDs correlated with BID among pregnant women will raise the risk of antenatal complications (e.g., preterm birth and low birth weight babies) (Roomruangwong et al., 2017). For the patients preparing for bariatric surgery, they will be more inclined to suicide and increase their self-harm behaviors because of the BID (Geller et al., 2020). By improving BID, the risk of development of the above situations can be lowered. For other diseases, BID improvement can benefit the quality of life.

Environmental factors, personal traits, and disease will impact the body image assessment. The social environment (e.g., cultural stereotypes, media propaganda) set the beauty standard of thinness for female (Sampath et al., 2019, Radwan et al., 2019, Weinberger et al., 2016, Izydorczyk et al., 2020, Aparicio-Martinez et al., 2019, Sen et al., 2020). Beyond this environment, family members and peers push women to pursue ideal-thin body image. Since women are laying excessive emphasis on their appearance (Marks, 2015), those with low self-esteem and self-identification would easily develop BID. Furthermore, some diseases affect the occurrence of the BID. Adolescents with asthma, cystic fibrosis, diabetes, or cancer have a higher BID rate Claytor et al., 2020(). Breast reconstruction surgery will affect BID during the different stages of the treatment (Teo et al., 2017). Besides, the side effects of physical variations due to chemotherapy can cause BID (Teo et al., 2017). Moreover, one-third of pregnant women have BID correlated with the weight increase (Roomruangwong et al., 2017).

The most used intervention therapy to BID is cognitive behavioral therapy (CBT) (Alleva et al., 2015). Other common intervention methods consist of "Fitness training, media Literacy, self-esteem enhancement, and Psychoeducation" (Alleva et al., 2015). CBT corrects negative psychology, cognition, and behavior correlated with body image through cognitive and behavioral modification techniques (Alleva et al., 2015), whereas its relief effort is limited, and more than a quarter of EDs patients remain ill after treatment (Omiwole et al., 2019). Fitness training, through aerobic or anaerobic exercise, is capable of improving people's perception of their own ability, enhancing self-efficacy, or reducing their attention to physical appearance. On the whole, media literacy intervention reduces the effect of media concepts through health education. Self-esteem enhancement intervention improves personal value perception by learning skills, enhancing abilities, and enhancing the cognition of their own advantages, thereby improving the feeling of body image. Psychoeducation is generally integrated with other interventions to tackle down negative body image problems through education.

Complementary and alternative medicine (CAM) for BID has a wider coverage, and most strategies are wilder and easier accepted. CAMs can act as the prevention strategies before the occurrence of BID and EDs symptoms, the auxiliary of CBT or TAU strengthening the curative effect and reducing the remained BID after the treatment preventing the reoccurrence of eating disorders. Some CAM strategies have no effect on BID directly, whereas they reduce the negative emotions (e.g., depression, anxiety, and stress) and adjust the misperception of body image. The major types of strategies affecting BID include nutritional therapy, fitness training, psychotherapy, and other complementary techniques. Psychotherapy contains strategies for improving emotion status and adjusting cognition. Other complementary techniques consist of music therapy, internet-based programs, and health promotion program.

2. Methods

The definition of CAMs applied in this study is identical to the explanation on National Center for Complementary and Integrative Health. As indicates from "complementary", non-mainstream practice supplements the traditional medicine. "Alternative" reveals that non-mainstream practice can replace the traditional ones. With the development of techniques, novel techniques and strategies are employed to promote health. The common CAM therapies comprise acupuncture, qigong, tai chi, yoga, herbs, aromatherapy, etc. The emerging techniques (e.g., VR and internet-based program) are also considered the complementary techniques.

BID is increasingly common among adolescents and young women in China, whereas it has not aroused sufficient attention. Except for providing treatments for patients with diagnosed EDs, effective interventions and prevention programs have not been offered to those at risk of EDs and in the presence of BID. Literatures regarding CAM and body image in recent 5 years were collected and analyzed, and a study protocol about body image satisfaction improvement was designed, integrating the Chinese culture for teenagers and young women, as an attempt to reduce the further incidence rate of EDs and promote health condition.

The related articles were searched and collected from PubMed. The terms comprised essential subjects (e.g., body image, body image dissatisfaction, body image disturbance, body satisfaction and body approaches), relevant factors (e.g., self-esteem, depression, anxiety, eating disorders, body perception and self-compassion), CAM strategies (e.g., yoga, traditional Chinese medicine, pharmaceutical cosmetics, Tai chi, Qigong, acupuncture, massage, dietary supplement, nutritional therapy, aromatherapy and thermalism), as well as terms "therapy" or "intervention." The relevant factors and CAM strategies were connected with OR in parentheses and then connected with essential subjects and other terms with the use of AND. Through Filter, the corresponding articles were preliminarily screened. The conditions for filtering included date "from 2015 to 2020", and language "English." Inclusion criteria for articles analyzed were: (1) abstract contains or describe specific treatments or techniques; (2) not only presenting CBT or TAU; (3) not a case-study; (4) not a study protocol or design description; (5) full articles including effects of treatment; (6) other than the hormone therapy that specific benefits the transgender population. On the whole, 52 articles were included in Fig. 1.

3. Results and Discussion

The mentioned literature described the effects of CAM on improving body image and mental state, or impacting body-related psychology and cognition. Three-fifths of the articles directly investigated the effect of CAM on BID improvement, adjunctive EDs treatment and EDs prevention. Others aimed at the patients with breast cancer, polycystic ovary syndrome or pain. Subjectively, CAM is capable of change female's feelings concerned with their own bodies and themselves, adjusting their cognition of body image, enhancing the body-mind connection, improving self-esteem and relieving negative emotions. Objectively, as shown in Table 1, treatments improved body image and reduced EDs related risk behaviors.Table 1

3.1. Fitness training

Fitness training contains yoga, Tai chi, aerobic exercise, Pilates, dance/movement therapy, leisure and competitive sports, as well as exercise intervention. In general, fitness training can achieve body perception through movement and enhance body function and body image, while facilitating the connection between body and mind, and mitigating negative emotions and psychology.

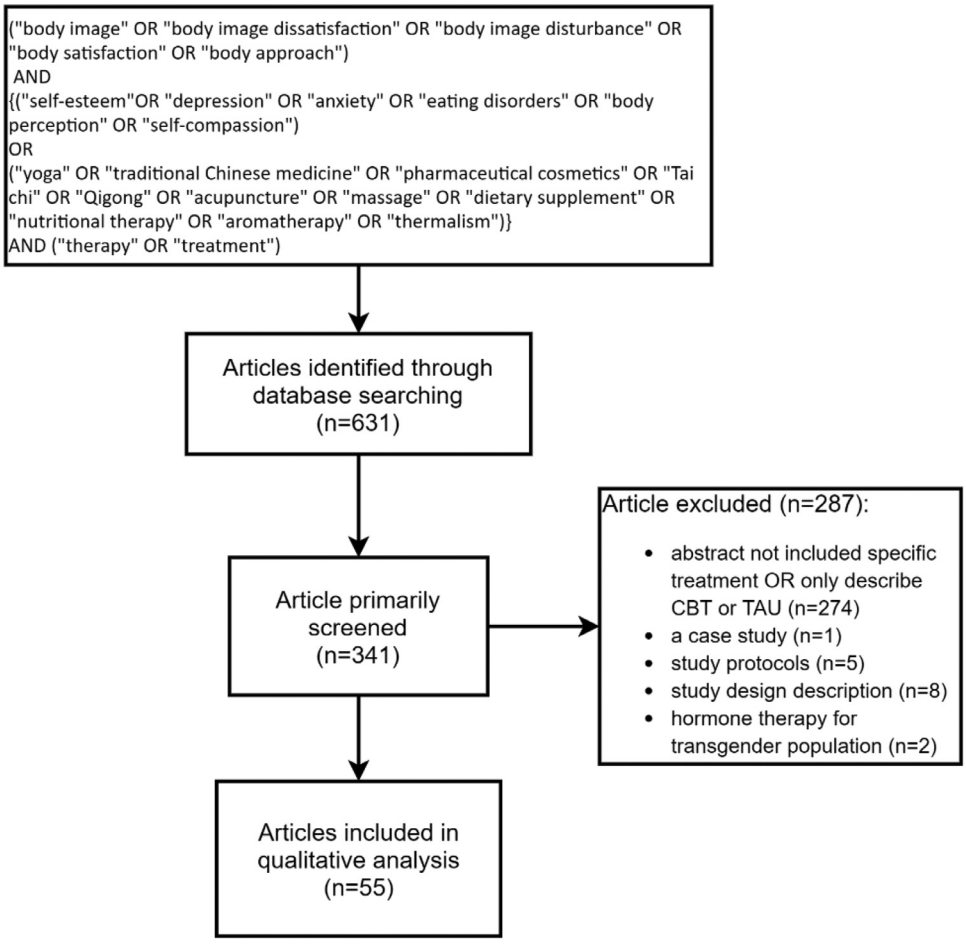

Fig. 1. The Process of the Literature Searching.

3.1.1. Yoga

Yoga through movement, posture change and breath helps people link their minds, bodies and spirits (Brown et al., 2017). A regular practice of yoga is capable of improving concentration, boosting self-esteem, reducing depression, and maintaining calm (Brown et al., 2017). For teenager with EDs, yoga acts as a milder treatment that can be more easily accepted and more effectively persistent (Hall et al., 2016). It is a gentler way to help teens accept, respect and challenge themselves, thereby reducing their concerns with body image and their depression (Hall et al., 2016).

3.1.2. Tai chi

Wang et al. (Wang et al., 2018) aimed at patients with fibromyalgia, providing guided materials regarding Yang Tai chi. Tai Chi can enhance patients' confidence and self-efficacy through physical and mental exercise, while helping them manage their symptoms, thereby mitigating negative emotions correlated with illness, improving mental health and improving quality of life.

3.1.3. Aerobic Exercise

As mentioned from Vancampfort et al., several studies reported that aerobic exercise can improve mental health (Vancampfort et al., 2018). Aerobic exercise can increase heart rate and improve cardiovascular health. Regular aerobic exercise is capable of effectively regulating mood and raising pain thresholds in the long time. The pain threshold is positively correlated with the positive assessment of body image (Wang et al., 2018). Moreover, the improvement of physical efficiency after aerobic exercise can facilitate the generation of positive emotions (Maurer et al., 2020).

3.1.4. Pilates

Şener et al. (Şener et al., 2017) aimed at breast cancer patients with lymphedema. Pilates combines exercise and breathing that can activate the body and improve body image. After practicing, patients could consciously control the muscles, thereby deepening the connection between their consciousness and the body.

3.1.5. Dance/Movement therapy

Dance/movement therapy used rhythmic movement to release and express emotions and stress (Bradt et al., 2015). In the movement, patients felt less negative emotion (e.g., depression, as well as more happiness and vitality) (Savidaki et al., 2020). Dance/movement increases self-efficacy, thereby increasing body awareness and positive connection between mind and body (Bradt et al., 2015, Savidaki et al., 2020). As the practice largely occurs in groups, patients can perceive themselves and others in an external environment (Bradt et al., 2015) and interact with others via movements (Savidaki et al., 2020) to facilitate all-round mental, physical and social health.

3.1.6. Leisure and competitive sports

Jankauskiene et al. (Jankauskiene et al., 2020) conducted a cross-sectional study among year 11 students. Sports are capable of increasing the perception of body reification, reducing body objectification, and improving positive body image. Teenagers attending the sports, whether leisure or competitive, have higher body appreciation. However, among sports active teenagers, the pressure relating to ideal body is not reduced and even higher, since they receive pressure from peers and coach that push them to stay in shape and keep the weight.

3.1.7. Exercise intervention

Therapeutic exercise for women with HIV-positive reduces depression and positively affects the body image (Daniels and Van Niekerk, 2018). For the females with breast cancer, exercise intervention allows them to maintain lower levels of depression, better physical performance, higher quality of life, and had the potential for survival rate improvement (Penttinen et al., 2019). Caregivers or patients with higher knowledge reserves about disease can benefit self-management (Daniels and Van Niekerk, 2018). Patients receiving particular concern or felt support always have a better outcome (Daniels and Van Niekerk, 2018; Penttinen et al., 2019).

3.2. Physical therapy

Physical therapy contained acupuncture and beauty care. The two were not correlated with EDs, but with body-related cognition and emotions.

3.2.1. Acupuncture

Brown, Rojas & Gouda (Brown et al., 2017) and Jung et al. (Jung et al., 2015) discussed the effect on pain relief among adults. Jung et al. mentioned the acupuncture stimulated cognitive and emotional processing in the brain. During the acupuncture, the perception of the body part will be emphasized (Jung et al., 2015). This finding reveals that acupuncture may be tried in BID or EDs in the future, performing a similar diversion to the effect of other CAM therapies or adjusting cognitive of body image by stressing the perception of the particular area.

3.2.2. Beauty care

Di Mattei et al. (Di Mattei et al., 2017) and Richard et al. (Richard et al., 2019) aimed at the women suffering from cancer treatment appearance-related side effects. The mentioned women felt their appearance damaged, thereby inducing their anxiety and depression. Beauty care includes courses and practice of makeup, beauty treatment (Richard et al., 2019), massage and pedicure (Di Mattei et al., 2017). All of the mentioned made women rebuild the connect with their body (Di Mattei et al., 2017), felt that they have regained their beauty and femininity (Di Mattei et al., 2017) and become attractive again (Richard et al., 2019). The mentioned feelings improved negative emotions correlated with appearance and increased self-esteem. However, if beauty care is to be implemented in BID group, it should be noted that excessive attention to their appearance attractiveness and others' assessment of their appearance may aggravate BID.

3.3. Psychotherapy

According to effects, psychotherapy falls into two categories, i.e., emotional improvement and cognitive adjustment. Emotional improvement comprises mindfulness, hypnosis and BEfree. Cognitive adjustment contains Practice Body Image Therapy, Acceptance and Commitment Therapy, Bouldering psychotherapy, VR, body illusion, Cognitive Bias training, feedback-based treatment, Interpretation Bias and Hoop training.

3.3.1. Mindfulness

Mindfulness is a meditation practice that focuses on the present moment without prejudice (Brown et al., 2017). It can only affect the psychological variation (e.g., emotional and cognitive variations) to alter the perception of the physical (e.g., pains) (Brown et al., 2017; Rahmani and Talepasand, 2015,). Rahmani and Talepasand (Rahmani and Talepasand, 2015) found that mindfulness improved emotional function most effectively among patients with cancer. Omiwole et al. (Omiwole et al., 2019) illustrated that for teenage girls, mindfulness could ameliorate the psychological factors correlated with EDs (e.g., concerns about weight and size, internalized ideal-thin, and psychosocial disorders).

3.3.2. Hypnosis

Hypnosis is applied in pain treatment to lower pain perception or raise pain threshold during induction, suggestion and awakening (Brown et al., 2017). In the future, hypnotic psychological therapy may be combined with education or treatment to change women's excessive care about body image, internalized ideal-thin body image, and make them no longer care excessively about the outside world's opinion.

3.3.3. BEfree

BEfree consists of psychoeducation, mindfulness and compassion, thereby helping patients with binge eating disorder focus on internal experience through building self-acceptance attitude and interrupting the response that can cause negative emotions (Pinto-Gouveia et al., 2017). Self-compassion helps patients feel responsible for themselves and adjusts their pathological behaviors and spirit. Accepting, confronting and processing the complex internal thoughts and emotions are the key process to alleviate the negative effects (e.g., shame, depression).

3.3.4. Practice body image therapy

Practice body image (PBI) therapy covers the cognition of body image, against tries of body avoidance behaviors and the adaptation to mirror exposure (Biney et al., 2020). Before the mirror exposure involved, PBI reduces the occurrence of body avoidance behavior and improves body perception and belief among teenagers with AN. Mirror exposure can improve the effect of PBI on weight concern, body avoidance behavior and anxiety related to appearance.

3.3.5. Acceptance and commitment therapy

Acceptance and Commitment Therapy (ACT) refers to facing and accepting pain, discomfort and all internal experiences in a short period, requiring patients to explain personal life values in a state of anxiety, so it can enhance psychological flexibility. ACT uses short-term pain to help patients develop a more positive connection with their bodies and a more positive attitude toward their bodies. ACT improves body image attitudes in patients with PCOS (Moradi et al., 2020), EDs (Fogelkvist et al., 2016), and even those with BID after ED treatment (Fogelkvist et al., 2020). For the latter two, patients shift their attention from body image to life value and the life they desire after ACT, thereby reducing their dissatisfaction with body image. Although the effect of ACT is significant, it can cause considerable pain during treatment and may worsen the disease (Fogelkvist et al., 2020). Further studies should be conducted to improve the safety of ACT.

3.3.6. Bouldering psychotherapy

Bouldering psychotherapy combines bouldering practice, mindfulness practice, and psychotherapy (Karg et al., 2020). After completing mindfulness exercises and psychological education on various topics correlated with depression, patients are asked to relax, feel their underlying emotions through bouldering, and learn more about their thoughts or behavior traits. In the exercise, patients communicate with others their own experiences and discuss how to apply bouldering in their lives to improve their lives quality. Bouldering psychotherapy is beneficial to depression, and is lasting longer and more effective than exercise, which may be correlated with the adjustment of the thinking and coping ways of depression.

3.3.7. Virtual reality and body illusion

Virtual Reality (VR) has been increasingly used as a novel tool for diagnosis, treatment and prevention over the past few years (Clus et al., 2018). VR and body illusion are both to expose people's consciousness to the virtual environment of specific settings, stimulate the change of emotion and perception (Carvalho et al., 2017), and then affect the response when facing the identical environment and stimulus in practice (Clus et al., 2018; Preston et al., 2020,). For EDs patients, different levels of stimulation change their mood and cognition, and the virtual environment is more consistent with or close to the practical world, for

instance, the more people communicate with others, the more likely their BID will be improved (Mountford et al., 2016). For patients with arthritis pain, body illusion reduces their pain and increases their subjective sensory flexibility (Preston et al., 2020). People with BID are subjectively dissatisfied with their bodies. VR and body illusion can reduce BID by adjusting subjective cognition.

3.3.8. Cognitive bias training

Gledhill et al. conducted the cognitive bias training first among female undergraduate student with body shape concern, and then among female with AN (Gledhill et al., 2017). In this study, participants could adjust their judgments of the body shape through judge the "thin" or "fat" of the body in the pictures and receiving feedback "correct" or "incorrect" after each choice. For women with or without the EDs, the bias and concerns of body size and body shape can be alleviated and last for long, so the EDs related behaviors will be changed.

3.3.9. Feedback-based treatment

Imperatori et al. reviewed existing research of neurofeedback and biofeedback training. Both trainings aim to reduce arousal stress mechanisms and enhance control ability (Imperatori et al., 2018). Both types of feedback training improve part of EDs symptoms (e.g., food cravings, binge eating and rumination, diet restriction and weight concerns) but not others (e.g., body image disorder). Subsequent experiments can attempt to combine neurofeedback and biofeedback training with cognitive feedback training to treat EDs, which may be more effectively.

3.3.10. Interpretation bias modification

Bradatsch et al. conducted study about interpretation bias modification to reduce body dissatisfaction (Bradatsch et al., 2020). Although the internalized ideal-thin decreased in the study group, this improvement could not be accepted as the effects since this indicator was not tested in the control. According to Bradatsch et al., this intervention could not be recommended to treat BID. Based on the current results, this intervention can be redesigned the experimental process and perhaps as a treatment for BID in the future.

3.3.11. Hoop training

Hoop Training allowed AN patients to choose a hoop, walking through their body and providing external stimulation that helped patients judge their body size based on external stimulation, and their cognition of body shape was adjusted (Keizer et al., 2019). Hoop training was a good auxiliary way to fill the blank of TAU treatment regarding body image disturbance.

3.4. Nutritional therapy

Nutritional therapy includes nutritional supplement and dietary treatment, correlated with the specific nutrition's function and dietary behavior changes.

3.4.1. Tryptophan supplement

Díaz-Marsá et al. reviewed the physiological and neurological effects exerted by tryptophan and deficiency symptoms (Díaz-Marsá et al., 2017). The symptoms identified in EDs are correlated with a reduction in tryptophan. Tryptophan supplementation may help mitigate binge eating, rumination, mood swings and anxiety-depression in EDs patients.

3.4.2. Atkins diet

Atkins diet refers to the diet without sugar and high carbohydrate food (Ahmed and Ezzat, 2018). For the obese women, Atkins diet could improve their self-esteem, happiness and exercise frequency, whereas the mentioned results were suggested as the benefits of weight loss. It might reduce BID by decreasing weight in obese and overweight people with their huge body image concern.

3.4.3. Mediterranean diet

The Mediterranean diet abounds with magnesium and tryptophan (Martínez-Rodríguez et al., 2020). Simultaneous supplementation of magnesium and tryptophan reduces negative emotions, eating disorders and BID in women with fibromyalgia. The effects of tryptophan supplements are improving cognition and emotions, whereas whether the effect of magnesium can enhance the effect of tryptophan or benefit mood, eating disorders, BID or sleep quality alone should be studied in depth.

3.4.4. Nutrition counseling

Nutrition counseling has two types, i.e., grouped and individualized (Bolognese et al., 2020). Both interventions provide eating plans, which aim to change the dietary behaviors. The effects of improvement on self-esteem and attitude of dietary, and reduction on body dissatisfaction and anxiety are the identical in both types. However, grouped nutrition counseling exert better efforts on self-acceptance and anxious reduction. The reasons may be correlated with competition and support in the collective.

3.4.5. High polyphenol diet

Kontogianni et al. provided high polyphenol diet (fruit and vegetables, barriers and black chocolate) for high blood pressure patients (Kontogianni et al., 2020). The results indicated the benefits on depression and physical and psychological health. Although other nutrients in the diet could also positively affect mental health, and the effect of polyphenol was unclear, this diet worked and could be attempted in EDs patients and people with negative emotion of bodies.

3.5. Other complementary treatments and techniques

This category covers music therapy, some combined health promotion programs and internet-based interventions. All music therapy, most health promotion program and internet-based interventions aim at people with EDs diagnose or EDs risk population.

3.5.1. Music therapy

Bibb, Castle and Newton (Bibb et al., 2015) initially tried music therapy among EDs patients, and Testa et al. (Testa et al., 2020) reviewed music therapy working among EDs patients. Listening to music, singing, listening to audio broadcasts and producing songs can help ease eating anxiety (Bibb et al., 2015, Testa et al., 2020), probably because of the distraction during treatment (Bibb et al., 2015), whereas watching music videos would increase body anxiety as impacted by the stimuli of body picture presented (Testa et al., 2020). Group sharing can enhance the effect (Bibb et al., 2015), which may could be tried for people with BID to find whether it can be a preventive strategy.

3.5.2. Combined health promotion programs

Body Project Therapy (BPT) (Stice et al., 2020), Healthy Weight EDs Prevention (Stice et al., 2019), Project Health (Stice et al., 2019) and brief school-based body image intervention 'Dove Confident Me: Single Session'(Diedrichs et al., 2015) are programs aiming at students with EDs risk. BPT reduced all risk factors, EDs symptoms and the incidence rate of EDs (Stice et al., 2020). Healthy Weight EDs Prevention and Project Health helped students change diet habits and exercise to get the goal of energy balance (Stice et al., 2019). The latter one introduced activities regarding cognitive dissonance in lifestyle to facilitate the healthy lifestyle. Both programs could effectively reduce the symptoms of eating disorders, especially in people with high levels of negative emotions and emotional eating (Stice et al., 2019). Brief school-based body image intervention 'Dove Confident Me: Single Session' primarily provided health education. Female benefited more significantly from the intervention, thereby reducing negative effects and EDs, while improving self-esteem and reducing eating restraint behaviors (Diedrichs et al., 2015). Body Project Therapy (BPT) (Stice et al., 2015, Kilpela et al.,

2016, Stice et al., 2019), Peer Mentor programs (PMPs) (Beveridge et al., 2019), CBT guided self-help program (Shea et al., 2016) and Reduced Environmental Stimulation Therapy (REST) (Khalsa et al., 2020) are programs of treating EDs. **BPT** has two types, i.e., normal BPT or dissonance-based BPT. BPT is capable of significantly reducing ideal-thin affirmation, body dissatisfaction, negative emotions and dysfunction (Stice et al., 2019), and dissonance-based BPT exerts better efforts on diminish of internalized ideal-thin and EDs symptoms (Stice et al., 2015). A gender-mixed environment dissonance-based BPT may not help improve females (Kilpela et al., 2016). **PMPs** and **CBT guided self-help program** were providing peer supports (e.g., information, experience, emotional support (Beveridge et al., 2019) and sense of acceptance (Shea et al., 2016)), thereby facilitating physical and mental health. **REST** allowed people to alleviate their negative emotions and gain calm and energy when floating, whereas this is more demanding on equipment or environment since it requires minimization of all senses (i.e., sight, hearing, smell, taste, heat and touch) (Khalsa et al., 2020). **CBT plus multidisciplinary lifestyle intervention** (Jiskoot et al., 2020), aiming at female with polycystic ovary syndrome, changed cognition and eating habits and promoted exercise. The weight loss acts as the vital element correlated with self-esteem improvement. Social support might be beneficial for depression reduction. **Midwifery-based counseling support programs** (Hamzehgardeshi et al., 2017) employ lectures and discussions to help breast cancer patients learn about body image and reduce stress by relaxing muscles and changing appearance. The content of this program can be tried in BID population.

3.5.3. *Internet-based interventions*

On the whole, Internet-based interventions are characterized by low cost, wide coverage and high effectiveness. The **eBody Project** (Stice et al., 2020) refers to an internet-form of dissonance-based BPT aiming to prevent EDs occurrence. It includes self-educated activities and games and reduces risk factors, internalized ideal-thin, dieting and incidence rate of EDs in the follow-up. **Internet-based Healthy Body Image (HBI) program** (Fitzsimmons-Craft et al., 2019) is to screen, assess and provide personalized intervention plans for attendants online. On this internet platform, attendants can receive a coach help for finishing the intervention contents, which contain key parts of CBT. Mobile EDs intervention is capable of reducing the EDs behaviors (dietary restriction and binge eating) in the short term, whereas it cannot work well on psychological improvement. The most significant advantage of this program is to increase the screening rate of people with EDs and people at risk in universities at a low cost. **Guided Online and Mobile Self-Help Program** (Nitsch et al., 2016) primarily allows for preference setting, feedback, personal coaching and providing self-monitoring, psychoeducation, practice, interaction and CBT. The vital element of this program is coaches needing to help and support attendants finish the plans. Both Internet-based Healthy Body Image (HBI) program and Guided Online and Mobile Self-Help Program mentioned design of the platform and program (e.g., interface design, content guidance, coaching settings and follow-up services), thereby probably affecting the results. **Online Drug Abuse Prevention Program** (Schwinn et al., 2018) consists of lessons on body image, coping techniques and rejection techniques. After online intervention, self-esteem, media literacy and self-esteem increased among girls. The program can be transformed and exploited to girls with body concerns, since some lessons are also required in BID improvement education.

Besides the various physical and mental improvement functions in the mentioned articles, the other common denominator that emerges is the support mentioned in many of the programs. On the whole, support covers social support (Di Mattei et al., 2017, Jiskoot et al., 2020, Fitzsimmons-Craft et al., 2019), peer support (Stice et al., 2020, Beveridge et al., 2019), group support (Rahmani and Talepasand, 2015, Bolognese et al., 2020, Jiskoot et al., 2020, Stice et al., 2015) and family/couple support mentioned in another study protocol (Kirby et al., 2015). Social support and group support provide emotional and material support to homogeneous people (e.g., same gender, suffer from same concerns), so they do not feel isolated (Di Mattei et al., 2017). Peer support refers to guiding and helping patients in a more intimate and empathetic manner that peers who have had suffered from the identical disease shared experience (Beveridge et al., 2019). Peers would gain more insights into the pain that would experience during therapy and the way to overcome it. Through sharing and providing support from peers, patients can feel more hopeful of healing, and they are more motivated to call into action (Beveridge et al., 2019). Family members can improve the treatment for teenagers with EDs (Kirby et al., 2015). Since part reasons of BID for female are attributed to comments from male and attractiveness to men, couple-based intervention allows holding close communications between the genders and eliminating possible problems and misunderstandings (Kirby et al., 2015). Compared with individualism, women in collectivism need more support from society, family and partners (Shea et al., 2016). Denial refers to a cause of negative emotions, while affirmation and support facilitate the positive effects.

In the mentioned articles, distraction and body connection are two points suggested to be opposite but are somewhat related in mechanism. Music therapy distracted the focus from feeling body inwardly to the outside things (e.g., singing and composing) and expresses the inner emotions through the mentioned things. Fitness training, on the other hand, used movement to increase connection with the body and shift attention from focusing on body shape or size to focusing on body function. Instead of promoting empathy and acceptance of the body, the mentioned treatments let people pay attention to other things and stop thinking about worry, anxiety and dissatisfaction of body or eating behaviors.

4. A Qualitative Study Protocol for the Effects of Mixed CAMs on BID

The existing research and investigations on BID in China are mostly the assessment of needs without further intervention to address it. This study protocol was a combined health promotion program consisting of yoga, health education and psychological counseling, aiming at the students of junior-senior high school. The main subjects of the study and data analysis were girls, whereas boys also participated in the experiment to simulate what would happen in a more realistic environment.

"In Flavor of Myself" program refers to an interactive and universal program designed for co-educational schools to build a healthy body image concept, improve the ability to resist inappropriate environmental information and reduce the risk of future eating disorders (Golan et al., 2013, Golan et al., 2014). However, this program has only been conducted in western nations, which should be modified to suit Chinese culture. This study protocol was based on "In Favor of Myself" program, aiming to improve girls' self-esteem, help them establish a correct concept of body image, educate the knowledge of healthy body and help girls realize their values. It ultimately aims to reduce BID and further prevalence of EDs.

4.1. *Study design*

Four junior high schools, four general senior high schools and four vocational senior high schools interested in the program within the city area of Hangzhou were randomly selected by a screening software. Schools providing special classes or art classes were excluded from the random process. We randomly assigned two junior high schools, two general senior high schools and two vocational senior high schools for the intervention group, and the rest were classified as the control group. Grade One and Grade Two were chosen in each school, two classes were randomly selected in each grade. All students in the mentioned classes were invited to attend the program. They would be told before attendance that this program is conducive to physical and mental health. We would inform parents of the purpose and general process of the pro-

gram in the form of meeting or text notification in advance and require parents to sign the agreement on informed consent.

This program would be held as the after-school activities for intervention groups. Control groups would receive educational materials containing the similar contents of the courses. The curriculum contents for junior and senior high school students in intervention groups were consistent. This program had nine sessions, each of which had its topic (content details presented in **Table 2**). The duration of each session was 90 min, as divided into two weeks with 45 min per week on Monday. Besides the course contents, a 30-minute yoga class would be taken on Wednesday.

In the first class of the course, instructors randomly assigned students into eight groups, which were termed the praising groups, each of which should contain both genders. In the respective discussion part, they would work as a team. Each one of the groups should be given a chance to illustrate the discussion results to the class. Regardless of his/her performance, other group members should give him/her a praise. The instructor repeatedly emphasized that there was no right or wrong answer for any discussed question, and that each speaker should be respected. This was a course rule trying to create a positive environment. Instructors should arrange the time and orders to meet and talk to each student individually about their feelings and ideas regarding appearance, voice bullying, negative emotions and self-esteem, and then offer positive psychological guidance. In the semester, the students could volunteer to make extra appointments with the instructors and ask for psychological support.

For session One to Eight, the instructors would present a background introduction in the first week of the session and expedite the discussions in the second week. At the beginning of classes in the second week, one group would give a 5 min presentation or role-play to the classmates and remind them of the discussion topic discussed last week. The respective group would take a turn. Regardless of their expression, others should encourage them. For the activities, especially in Session Five, Responding to Voice Bullying, every group should prepare the role play. The instructors would encourage students to share the stories happening in real life, thereby creating empathy. Session Nine is regarding the performance, showing the feeling or knowledge they learn in this course. Students could perform in any way they want. This performance would be held in the class time of the last week. Students in the school and their parents would be invited. Before the performance starts, the instructors informed everyone to provide voice and behavioral encouragement.

Instructor training sessions would be held during the summer vacation. The respective school should pick at least two psychology teachers or teachers with a psychology background to attend the training session, i.e., a four-week, eight-day training. The background teaching of each topic would be in the morning, and participants would brainstorm the discussions and activities in the afternoon. The teachers should attend whole sessions of the training. The course materials would be offered.

4.2. Ethics

Schools, students and parents would gain insights into the purpose of the experiment. The parents would sign the informed consent in person.

Instructors would undergo strict training to ensure safety in class and yoga practice.

The experiment would be performed in schools. Researchers would maintain close communication with schools, teachers and parents to ensure that the experiment is carried out smoothy.

4.3. Data collection and analysis

Before the classes begin, students in intervention groups and control groups would complete the baseline collection. At the end of the 18-week course, students would repeat measurements as post-intervention results. Attendance would be collected through check-in lists. The class participants and students' class performance should be determined by the instructors' observation.

The Body Esteem Scale (BES) (Zhang et al., 2018), Perceived Sociocultural Pressure Scale (PSPS) (Golan et al., 2014), the Ideal Body Stereotype Scale-Revised (Zhang et al., 2018), Figure Body Images (FBG) (Kirby et al., 2015), Positive and Negative Affect Schedule (PANAS) (Golan et al., 2014) and EAT-26 (Kirby et al., 2015) would be employed. Students would conduct the scales on the computer. Since the stress here was primarily on girls, they would be required to finish all of them, whereas boys should only finish PSPS and the Ideal Body Stereotype Scale. BES covers the items regarding one's perception of his/her appearance and weight. PSPS comprises all items assessing pressure from the environment, peers and family on their appearance. The Ideal Body Stereotype Scale simply covers the ten items concerned with opinions on attractive women, combined with Figure Body Images. 20 items about their positive and negative feelings over the past week are to be scored via PANAS. EAT-26 presents 26 items to assess the risk of EDs. Comparing the data differences between the intervention group and the control group before and after the intervention aims to qualitatively analyzed whether the grogram improves self-esteem, body shape assessment, positive emotion and lower EDs risk of female students. We would analyze whether differences in attendance and class participation rates causing differences in improvement outcomes. Comparing the difference of data changes between the control group and the intervention group, we could infer whether group activities, praise, yoga and other activities could induce a greater impact.

Besides the scale mentioned above, we will design a questionnaire for both the control group and the intervention group to get the information about what contents or topics have the greatest influence on them, which part of the contents or classes setting makes them start to act, and what contents have the greatest influence on their psychological variations or ideological variations. The different number of boys in each group may also be one of the factors affecting the results, which can be placed in the questionnaire as an option. Based on the mentioned feedbacks, we can determine which content or activity has played a greater role.

We expect that after intervention, girls' self-esteem and positive emotion improve, risk of EDs and stop attaching their value to other people's assessment of their body image but to their abilities.

4.4. Strengths and limitations

This protocol combines group support, shifting attention from focusing on one's physical appearance to enhancing one's value, and alleviating pressure and emotions through yoga. Comparing to the original "In favor of myself" program, we added four novel elements (i.e., praise, psychological counselling, nutrition education and yoga) to the content. China is collectivist, and the collectivist view of the world does not comply with the individualistic values of mainstream psychotherapy (e.g., cognitive behavioral therapy) (Shea et al., 2016). Emphasizing that the problem is personal only makes people feel more painful. Praise from class members and peers make people feel accepted and validated, which is more essential for collectivist. Whether the performance is good or bad, group members will give encouragement, thereby making people feel the support and strength from the group, which helps improve self-esteem and confidence. Psychological counseling will provide positive guidance according to the psychological status of each student at the time of counseling, with the intention of reducing unconscious verbal bullying or harmful behaviors. When everyone else in the environment is using verbal bullying, others will follow suit and may be unaware of their behaviors. We will let the students understand that and attempt to create a more positive environment in the intervention classes. For teenagers remaining in the growth and development period, adequate nutrition is of high significance. Besides, nutrition education courses are also used to promote in dietary behavior changes of students. Yoga is the activity that teenagers interested and could improve the negative

Table 1
Summary of CAM Treatment and Its Effects on Physical and Psychological Improvement

Type Of CAM		Treatment	References	Effects
Fitness Training		Yoga	Hall et al., 2016 Brown et al., 2017	↑academic performance, behavior, concentration, emotional balance and self-esteem ↑mood and function in patients with depression ↓depression and anxiety, negative emotion ↓worry about weight and body shape
		Tai Chi	Wang et al., 2018	↑confidence, self-efficacy ↓negative effect of body and emotion
		Aerobic Exercise	Wang et al., 2018 Vancampfort et al., 2018 Maurer et al., 2020 Karg et al., 2020	↓anxiety and depression ↑positive emotion, positive body image ↑mental health
		Pilates	Şener et al., 2017	↑body image, quality of life, body function ↑connection of mind and body
		Dance/Movement Therapy	Bradt et al., 2015 Savidaki et al., 2020	↑body image ↑self-efficacy, positive emotion, happiness ↑body connection, body consciousness ↓depression, anxiety, stress, worries
		Leisure And Competitive Sports	Jankauskiene et al., 2020	↑body appreciation ↓body objectification
		Exercise	Daniels and Van Niekerk, 2018Penttinen et al., 2019	↓depression, ↑positive emotion ↑body image, physical performance, quality of life
Physical Therapy		Acupuncture	Jung et al., 2015Brown et al., 2017	↓pain ↑perception of body parts
	Beauty Care	Beauty care intervention Health in the Mirror	Di Mattei et al., 2017Richard et al., 2019	↑perception of attraction ↑Quality of life, self-esteem, body image satisfaction ↓Depression, anxiety
Psychotherapy	Emotional Improvement	Mindfulness	Rahmani and Talepasand, 2015Brown et al., 2017 Omiwole et al., 2019	↑cognitive and emotional health, mental clarity ↓fatigue, pressure, worries of weight and body size, internalized ideal-thin ↓diet restraint, eating disorders symptoms, psychosocial disorders
		Hypnosis Befree	Brown et al., 2017 Pinto-Gouveia et al., 2017	↓pain perception ↓severity of binging eating disorder ↓shame, depression ↑quality of life
	Cognitive Adjustment	Practice Body Image Therapy	Biney et al., 2020	↓body image dissatisfaction, weight worry, body image avoidance, appearance anxiety
		Acceptance And Commitment Therapy	Fogelkvist et al., 2016Fogelkvist et al., 2020 Moradi et al., 2020	↑psychological flexibility, psychological resistant ability ↑positive relationship with body, body awareness, self-esteem, ↓body image concern, attention to the body
		Bouldering Psychotherapy VR	Karg et al., 2020 Mountford et al., 2016Carvalho et al., 2017 Clus et al., 2018 Alemanno et al., 2019	↓depression ↑perception of body image ↓food related anxiety ↓binging eating disorder behavior
		Body Illusion	Preston et al., 2020	↓pain
		Cognitive Bias Training	Gledhill et al., 2017	- Change judgement of thin and fat ↑concern of body size, body shape and diet
		Feedback-Based Treatment	Imperatori et al., 2018	↓food desire, binging eating, rumination, restrict behavior ↓worry of diet and weight, pressure ↑control ability
		Interpretation Bias Hoop Training	Bradatsch et al., 2020 Keizer et al., 2019	↓internalized ideal-thin ↑estimation of body size and body scale
Nutritional Therapy	Nutritional Supplement	Tryptophan supplement	Díaz-Marsá et al., 2017	↓anxiety, depression, impulsivity, binging eating behavior
	Dietary Treatment	Atkins diet Mediterranean diet	Ahmed and Ezzat, 2018 Martínez-Rodríguez et al., 2020	↓weight ↑emotion and cognitive function, body image, sleep quality ↓anxiety, sadness, loneliness, afraid
		Nutrition Counseling High Polyphenol Diet	Bolognese et al., 2020 Kontogianni et al., 2020	↓body dissatisfaction and anxiety ↓depression

(*continued on next page*)

Table 1 (*continued*)

Other Complementary Treatments and Techniques	Music Therapy	Music Therapy	Bibb et al., 2015Testa et al., 2020	↓anxiety relating to food, anxiety of body image ↑perception of body↓image
	Combined/Health Promotion Program	Lifestyle Intervention	Jiskoot et al., 2020	↓depression ↓weight↑self-esteem
		Body Project Therapy	Stice et al., 2015Kilpela et al., 2016 Stice et al., 2019 Stice et al., 2020	↓internalized ideal-thin, ideal-thin affirmation, body dissatisfaction, negative emotions (worries), dysfunction ↓risk factors, eating disorder symptoms
		Healthy Weight Eds Prevention Program	Stice et al., 2019	↓Eating disorders symptoms ↓negative emotion
		Project Health	Stice et al., 2019	↓Eating disorders symptoms
		Peer Mentor Program (Pmps)	Beveridge et al., 2019	↑BMI ↑positive emotion, gain support
		Cognitive-Behavioral Therapy Guided Self-Help Program	Shea et al., 2016	- Receiving Social support
		Midwifery-Based Counseling Support Program	Hamzehgardeshi et al., 2017	↓negative body image ↓negative emotion (worry, fear), tension, stress
		Reduced Environmental Stimulation Therapy (REST)	Khalsa et al., 2020	↓anxiety, stress, fatigue, negative effects, body dissatisfaction ↑lightness, happiness, energy, renewal, calmness
		Health Education	Diedrichs et al., 2015	↑self-esteem ↓negative effects, eating restraint, eating disorders
	technique support -internet-based	Ebody Project	Stice et al., 2020	↓internalized ideal-thin, dieting, incident rate of EDs
		Internet-Based Healthy Body Image (HBI)	Fitzsimmons-Craft et al., 2019	↓restrained eating, binging eating ↑Self-esteem, goal setting, media literacy and self-efficacy
		Guided Online and Mobile Self-Help Program	Nitsch et al., 2016	
		Online Drug Abuse Prevention Program	Schwinn et al., 2018	

Table 2
Description of the Main Content of the Topics

Session number	Topics	Description
1	Communication about the positive and negative emotion, and the self-esteem	Form the praising group; discuss about their understanding of the positive and negative emotion and self-esteem; discuss its influence
2	The body image	Educating the knowledge of the different types of body shape, the BMI range, and its body shape; discuss their own opinion about what is good or health or ideal body image
3	Perceive the information that influence the appearance judgement	Discuss and information from the culture and social media that affect the concept or idea about the appearance and body image
4	Development of the beauty	Describe the development of the concept change about the female body shape; share the artwork of the beauty in various cultures and eras; respect the different body shape
5	Respond to the voice bullying about the appearance	Discuss and identify the types and content of the voice bullying for the appearance; brainstorm the response to the voice bullying, and show it to the class through role play
6	Healthy body	Introduce the nutritious balanced diet, healthy lifestyle, and healthy way for the special needs, such as lose weight, muscle building, or body shaping
7	Internal, external and self-esteem	Discover the true self through meditation and yoga, discuss with group members, and volunteer to share the results with the class
8	Future thinking	Discuss about in the future, what they want to do on their appearance, how confidence to face and respond to the blame to body shape, and other questions related to the emotion, self-esteem, and eating behavior
9	Performance	Perform in front of their parents and other students, the content should be related to what they learned in this course. Performance forms include, but are not limited to dance, sing, and role play.

emotions (Hall et al., 2016), so besides the course content, yoga has been added as an auxiliary treatment.

Some limitations were identified in the designed intervention plan. There was selection bias in the school selection. Although random screening was used in the school selection process, all the selected schools were interested in participating in the project. The scope of selection was limited to Hangzhou, a leading city in China in education and economic level, so the experimental results cannot represent other urban areas and regions. Family impacts students' physical and mental development, whereas the current protocol has not provided the measurement about family impact. Since most topics are correlated with girls, boys may feel that they are not valued, refusing to follow instructions, or even resisting instructions. When implementing the plan, instructors could only monitor the behavior in the classroom, whereas the voice bullying from boys after classes might be exacerbated as impacted by rebellion. Although psychological counseling was designed to reduce the impact of rebellion, the provision of psychological counseling is sequential, and the time interval from the first to the last might be long, thereby causing the positive guidance effect of psychological counseling to be as ideal as expected. When designing interventions, the response to social media was eliminated, so girls might lack the ability to resist body images presented in the media.

5. Conclusion

BID begins during the teenage years and becomes more serious during college. More than 80% of female college students have BID. Body dissatisfaction leads to anxiety, depression, low self-esteem and unhealthy weight loss behaviors, which increase the risk of EDs. In addition, BID is also an important factor influencing the therapeutic effect and subsequent disease recurrence in EDs patients. Improving BID can not only prevent the onset of EDs, but also assist the treatment of EDs patients and reduce the risk of recurrence. CAMS could be used either alone or as an adjunct to TAU, improving negative emotions (e.g., stress, anxiety and depression), adjusting perception and cognition of their bodies, changing risky eating behaviors. CAM treatments and techniques currently available for improvement are physical exercises (e.g., yoga, aerobic exercise, dance/movement therapy, sports), psychotherapies (e.g., mindfulness, PBI, ACT, VR, cognitive bias training, hoop training), nutritional therapies (e.g., nutritional supplement, special diets), music therapy, health promotion programs and internet-based interventions. Yoga, sports, mindfulness, cognitive bias training, BPT, health education and project health could be the prevention strategies for teens and young females. Internet-based interventions could provide whole process, including screening, assessment, and treatment. Other body-mind therapies (e.g., Tai chi and aromatherapy) and other physical therapies (e.g., acupuncture and beauty care), which have been proved the benefits on reduction of negative emotion or body cognition, could be tried for people with body concern to prevent the occurrence of EDs.

Ethical Approval

Not applicable

Data Availability

Nil.

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Declaration of Competing Interest

The author declared no conflicts of interest to this work.

CRediT authorship contribution statement

Y Peng and H Xie conceptualized, designed, drafted and revised the manuscript.

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Supplementary Materials

Nil.

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